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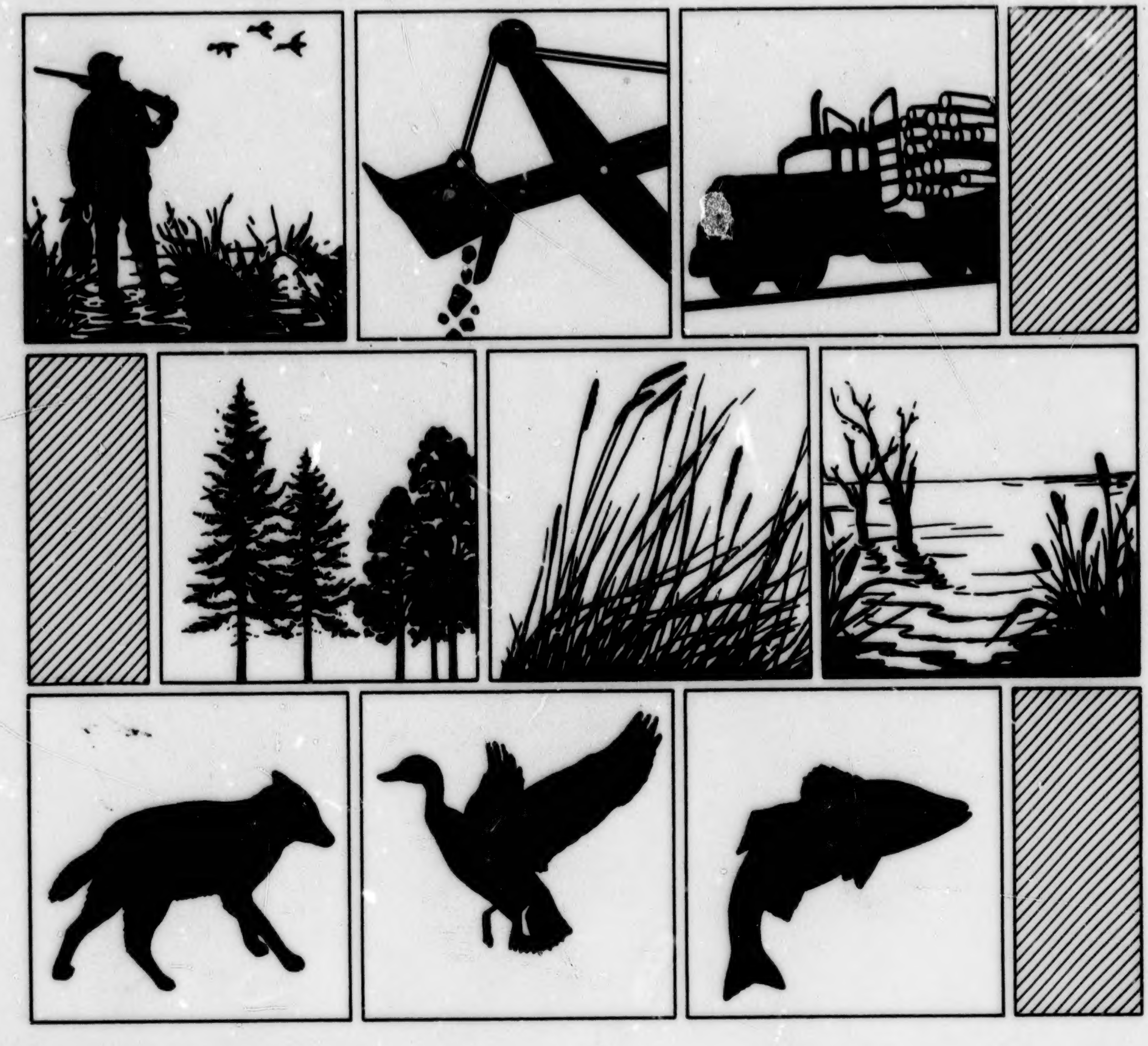
PREPARING A FWS CUMULATIVE IMPACTS PROGRAM: JANUARY 1985 WORKSHOP PROCEEDINGS



Fish and Wildlife Service

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PREPARING A FWS CUMULATIVE IMPACTS PROGRAM: JANUARY 1985 WORKSHOP PROCEEDINGS

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PREFACE

This report presents a program that will enable the Fish and Wildlife Service (FWS) to better understand environmental cumulative impacts (CI's) and to assess them more effectively. Experts who participated in an initial workshop (August 1984) analyzed the National problem (CI's are not being adequately addressed) and specified tentative actions to deal with the problem. Results of the first workshop underscored a need for overall guidance from Habitat Resources (HR) Program field users of CI assessment capabilities.

This second workshop document analyzes the specific problem facing HR field offices (CI assessments are not happening). This problem can be redressed only by convincing the responsible entities (both inside and outside the FWS) to conduct CI assessments. For that to happen, methods and processes are needed that the FWS may provide as technical capabilities, and these must be based upon the resource, not just regulations. In short, there is a technical deficiency in assessment tools due to an institutional hesitance in the responsible agencies.

Roy Heberger, in his review comments on this document, summed up our views of these workshop proceedings. This document accurately reports the tangible results of the workshop. It does not, however, have the intangible spice of the workshop atmosphere, which was quite exciting. Since the workshop, cumulative impacts have become a widely recognized and discussed HR Program issue. We foresee that this trend will continue as our Nation becomes more concerned about better management of fish and wildlife and their habitats.

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Special acknowledgment is extended to all of the U.S. Fish and Wildlife Service participants, representing nine regions, who developed the information contained in this document. Particular appreciation is extended to the Chief of the Division of Ecological Services, Marvin Moriarty, and the Chief of the Division of Biological Services, Edward T. LaRoe, for their contributions to clarification, expansion, focus, and consensus on the issue of CI assessment in the Habitat Resources Program.

Susan Carpenter, a conflict resolution specialist, was the workshop moderator; Richard Fisher was the official recorder; and Spencer Amend assisted in coordinating arrangements. Dora Ibarra, Elizabeth Barstow, and Patricia Gillis provided word processing services.

INTRODUCTION

The term cumulative impacts (CI's) is frequently confusing. Reed et al. (1984) succinctly defined CI's as "the incremental impacts of overall development in the affected region." Cumulative impacts (i.e., accumulating effects) from development and management of natural resources are continually increasing in importance. The impacts include destruction of fish and wildlife habitat, degradation of ecosystem components, and reduction in the environmental quality of life. Congress declared its concern for these consequences by enacting the National Environmental Policy Act (NEPA) in 1969, which recognized "the profound impact of man's activity on the interrelationships of all components of the natural environment" and "the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man."

Concurrent with the passage of NEPA, the Council on Environmental Quality (CEQ) was formed to promote the provisions of the act. Regulations published by the CEQ require an environmental impact study to include cumulative impacts:

> The statutory clause 'major Federal actions significantly affecting the quality of the human environment' is to be construed by agencies with a view to the overall, cumulative impact of the action proposed, related Federal actions and projects in the area, and further actions contemplated.... In considering what constitutes major action significantly affecting the environment, agencies should bear in mind that the effect of many Federal decisions about a project or complex of projects can be individually limited but cumulatively considerable. This can occur when one or more agencies over a period of years puts into a project individually minor but collectively major resources, when one decision involving a limited amount of money is a precedent for action in much larger cases or represents a decision in principle about a future major course of action, or when several Government agencies individually make decisions about partial aspects of a major action. In all such cases, an environmental statement should be prepared if it is reasonable to anticipate a cumulatively significant impact on the environment from Federal action (38 C.F.R. Sect. 1500.6) (emphasis added).

Dames and Moore (1981) defined cumulative impacts as the sum of all the changes--beneficial and detrimental--and the reinforcing or dampening interactions between them that occur as a result of development actions:

> Cumulative impacts include physical, chemical and biological changes; but they also include economic, social, and behavioral effects, such as changes in the way people use, share and enjoy the world around them and the natural resources which it affords; and the effects of these changes on their health, their economic well-being, their quality of life and their communities or basic social organization.

They stated that five types of impacts interrelate to form cumulative impacts: (1) direct; (2) secondary and indirect; (3) effects extended into time, space, and ecological systems; (4) aggregative and synergistic; and (5) growth inducing.

The CEQ defined cumulative impacts as:

> ...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Effects and impacts as used in these regulations are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects... (40 C.F.R. Sect. 1508.7).

The Fish and Wildlife Service (FWS) has jurisdiction by law or special expertise to comment on several areas of environmental impacts (and therefore CI's) including:

> air quality (effect on wildlife); water quality; marine pollution, commercial fishery conservation, and shellfish sanitation; waterway regulation and stream modification; fish and wildlife; pesticides (fish and wildlife effects); electric energy development, generation, transmission, and use; petroleum development, extraction, refining, transport and use (effects on fish and wildlife); natural gas development, production, transmission, and use; coal and minerals development, mining, conversion, processing, transport, and use; renewable resource development, production, management, harvest, transport, and use; land use changes, planning and regulation of land development; public land management (wildlife refuges); protection of environmentally critical areas - floodplains, wetlands, beaches and dunes, unstable soils, steep slopes, aquifer recharge areas, etc.; land use in coastal areas; soil and plant conservation and hydrology; and outdoor recreation (38 C.F.R. Sect. 1500 Appendix II).

The Habitat Resources (HR) Program directed the Division of Biological Services (DBS) to develop a capability that could be used by the FWS to assess and mitigate CI's more effectively. This document is a report of a workshop held January 29-31, 1985 to address this task. Participants in the workshop represented the HR Program's Division of Ecological Services (ES) and were from all FWS regions (Appendix A). The specific goals of the workshop, in priority order, were:

1. Obtain input from the Assistant Regional Directors for Habitat Resources on the needs for CI assessment technology.
2. Develop a comprehensive set of action items for an FWS CI program.
3. Establish priorities for action items that are agreed upon by workshop participants.
4. Identify appropriate prototype applications to develop and test a CI assessment process.

THE WORKSHOP

Workshop participants were asked to present overviews of CI problems and activities in their regions. They were asked to include the following information in their presentations:

1. CI problems within their region or scope of activity;
2. current methods used to assess CI's;
3. problems that prevent CI assessment; and
4. directions that the region would like to take in dealing with CI's.

During the presentations, two recorders compiled lists of CI problems, current methods of assessing CI's, and constraints that prevent CI assessment. After the presentations, the participants divided all of the CI problems into four major categories.

The participants then divided into four workgroups, each to work on one of the four CI problem categories. Each workgroup reviewed and refined its CI problem statement. Focusing on the problem statements, the workgroups brainstormed action items and discussed each item. The workgroups reviewed the suggestions made during the regional presentations and the potential action items published in the first CI workshop proceedings (Armour et al. 1985). All of the action items were listed and reported to the entire group of workshop participants. The entire group reviewed the lists of action items for missing, misplaced, or redundant items.

The participants then divided into nine workgroups based on the FWS regions. Each regional workgroup devised its own criteria and then ranked the highest third of all the action items within each of the action item categories. Each regional workgroup reported its rankings to the entire group. A tabulation was made of the action items that were ranked in the top third by all regions. For each category, action items were listed in decreasing order with respect to the number of regions that ranked them in the top third.

To further refine and focus the list of action items, each regional workgroup selected from among all four categories the 10 highest priority action items. Each regional workgroup reported its rankings and reasons for selections. The selections were tabulated and examined by the entire group. After the workshop, a composite list was developed from the nine regional lists by selecting action items that were designated as high priority by at least three regions.

In the final session, the questions "What needs to be done?", "By whom?", and "When?" were asked. The group brainstormed a set of follow-up directions with specific statements of tasks, dates, and responsible entities. Several of the follow-up directions involved getting an unedited version of the workshop results to the participants as soon as possible so that the results could be used at the ES field office supervisors' conference in late March 1985.

THE OUTCOME

The regional representatives presented a multitude of problems that are having a cumulatively significant impact on the fish and wildlife resources of the Nation (Table 1). We categorized these problems into five types: water development, land-use change, erosion and eutrophication, chemical disposal, and overharvest.

PROBLEM TYPES

The HR Program's influence over cumulative impacts is vested mostly in the area of water development. The field offices work with small hydroelectric facilities development (through reviewing and commenting on issuance of Federal permits and licenses) and with flood-control dams (through reviewing and commenting on Federal projects). Depending on Federal agency involvement level, HR examines proposed interbasin and intrabasin water diversions and the effects of altered stream flows on rivers, lakes, and estuaries. The HR field offices are responsible for evaluating the effects of dam complexes on anadromous fish (through commenting on both Federal permits and licenses and Federal projects). HR maintains a high level of involvement in the areas of dredging, filling, channelizing, and bank stabilization (through commenting on Federal permits and licenses).

Land-use change is generally the conversion of land from one economic use to a more profitable economic use. This change frequently causes a loss of fish and wildlife habitat value. The HR Program has some responsibility for land-use change CI's. The drainage of freshwater wetlands and conversion to agricultural and silvicultural production (popularly known as swampbusting) and the conversion of coastal wetlands to residential areas and marinas is influenced through commenting on Federal permits and licenses. The conversion

Table 1. Some CI problems within the FWS regions or their scope of activity that are affecting fish and wildlife resources (listed in the order presented).

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1. Development of small hydroelectric facilities.
2. Brush control projects (Southwest).
3. Flood control projects.
4. Development of coastal wetlands.
5. Wetland drainage (prairie potholes, along Mississippi River).
6. Interbasin and intrabasin water diversion.
7. Nutrient loading (estuaries).
8. Alteration of interlake connecting channels, shoreline erosion, winter navigation, water quality, power plant entrainment of eggs and larvae, and drawdown (Great Lakes).
9. Contaminant and waste product disposal.
10. Dredging, filling, channelizing, and establishing docks, pilings, and bulkheads (rivers and estuaries).
11. Highway, powerplant, airport, and transmission line construction and maintenance activities and right-of-way corridors.
12. Energy development (North Slope oil development, coal, shale oil).
13. Urbanization and removal of farm lands from production.
14. Air pollution and acid rain.
15. Mine tailings and placer mining.
16. Altered stream flow.
17. Public land management (grazing, timber harvesting, road development).
18. Eutrophication (freshwater lakes).
19. Effects of river system dams on anadromous salmonids (Columbia River).
20. Problems affecting striped bass (Chesapeake Bay).
21. Nonpoint source soil erosion.
22. Agricultural chemical use (herbicides, pesticides, fertilizers).
23. Sand and gravel removal operations (along waterways).
24. Conversion of wetlands for agricultural and forest production (bottomland hardwoods).
25. Conversion of marginal lands to agricultural production.
26. Overharvesting of key fish and wildlife species.
27. Agricultural irrigation return flows.
28. Mangrove stand damage.
29. Impacts on endangered species.
30. Tribal Indian fisheries.

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of marginal lands to agriculture (sodbusting) and shrubland to grassland (brush control) is generally unregulated. Urbanization is regulated by some city and county governments and by the Federal government in wetlands. Most mines, transportation facilities, and transmission corridors are not commented on by HR, unless they utilize Federal funds or occur on Federal land or in wetlands.

The erosion and enrichment category includes three CI problems identified by HR personnel: excessive nonpoint source soil erosion; excessive nutrient loading and sediment deposition in rivers, lakes, and estuaries; and resulting eutrophication of rivers, lakes, and estuaries. FWS does not have regulatory responsibility for these CI problems.

The field offices have responsibility (through commenting on Federal permits and licenses) to affect chemical disposal CI's if they are related to point source discharges of contaminants and waste products. The field offices are not in a strong position to influence nonpoint source discharges of contaminants and waste products; agricultural chemical use; mine tailings and placer mining; air pollution and acid rain; and agricultural irrigation return flows.

The FWS (but not HR) has direct and substantive authority to affect the recreational harvest of migratory birds and anadromous fish, but minimal authority to affect the sport and commercial harvest of other fish and wildlife. The HR field offices have authority to affect CI's if potential or actual mortality of endangered species, migratory birds, or anadromous fish can be demonstrated. The field offices have some responsibility through the NEPA process to affect excessive grazing and timber harvest on Federal lands, but have no responsibility to affect overharvest on non-Federal and Indian lands.

PROBLEM CHARACTERISTICS

Cumulative impacts can be characterized more easily than they can be defined. The problems are frequently complex and difficult to understand. Individual impacts frequently cannot be identified and displayed and sometimes may not even be perceived in the areas where they originated. Cumulative impacts are frequently more severe in aquatic and wetland habitats as they concentrate problems from terrestrial, atmospheric, and aquatic sources. CI problems usually involve physical, chemical, or biological degradation (not destruction) of the ecosystem.

Many CI problems can be solved only with a cooperative interagency and interdisciplinary approach. Public awareness of a CI problem is usually minimal until a threshold is exceeded, and then there are significant environmental, economic, social, or political consequences. Cumulative impacts are not generally recognized as being national or global in scale and there is little legal precedent or regulatory authority for dealing with them.

PROCESS CHARACTERISTICS

As with a CI problem, a CI assessment process can also be characterized more easily than it can be defined. There are no set methods for measurement, analysis, prediction, or control of CI's. Historical evidence of CI's is lacking, poorly understood, or poorly communicated. The geographic boundary of a CI assessment (zone of influence) may be large and controversial. A determination of CI thresholds may be required, but these currently are identifiable only after critical levels have been exceeded. A CI assessment may be required to evaluate a complex single action (e.g., interbasin water diversion), numerous similar actions (e.g., small hydroelectric facilities), or dissimilar actions (e.g., Chesapeake Bay restoration) as they affect an ecosystem. A CI assessment should be an adjustable, adaptive process, not a definite, preconceived method. The individual elements of a CI assessment process may not currently exist or, if they do exist, may not be currently organized and recognized as being appropriate.

ACTION ITEMS

Seventy-eight constraints that are preventing CI assessment were recorded from the regional presentations. This list was divided into four categories of constraints to addressing CI's: define terms, marketing, assessment tools, and institutional mechanisms.

In the category define terms, the difficulty centered around different perceptions of cumulative impacts and the misused or ill-defined new terminology of CI assessment. The new terminology of CI assessment, as it is developed, should aim to clarify, differentiate, and standardize. To focus the different perspectives appreciably, we have shortened the CEQ definition of cumulative impacts to "the incremental impacts on the environment due to collectively significant, but perhaps individually minor, actions." Cumulative impacts are not just secondary or indirect impacts, not just additive or multiplicative effects, not just the interaction or synergism between impacts, not just direct impacts on the stability/resistance and recoverability/resilience of the system, but instead are the aggregate or accumulation of all the effects on an ecosystem through time and space. Definitions of CI terminology frequently are a stumbling block, as they were early in the workshop, but not a major roadblock.

Marketing, as used here, refers to the need for developing understanding and support for CI assessments. The marketing category is required because of the lack of public awareness and concern for the CI issue. Impact assessment and mitigation currently are not popular issues, partly because of the perceived high cost of a strong conservation and stewardship ethic. CI's should evolve into a popular issue if the Nation is to successfully conserve, enhance, and protect fish and wildlife and their habitats.

Constraints related to assessment tools can be described as technique inadequacy; data, information, and knowledge inadequacy; bounding difficulties; and situation limitations. Technique inadequacy is not due to a lack of approaches and methods for impact assessment (there are many), but because of lack of a generic approach with a menu of standardized techniques tailored to a particular problem. The standardized techniques should allow us to track CI's, separate impact problems (e.g., chemical, physical, biological), and improve our communication ability.

Data inadequacy is caused by lack of the required individual fact or statistic or the means to get it (e.g., historical losses due to CI's). Information inadequacy is caused by lack of the required data or too much unrelated or unnecessary data. Knowledge inadequacy is caused by disorganization of information, which may be characterized by missing or unnecessary data. An information management process is needed that can analyze data, synthesize information, and organize knowledge for wise environmental management decisions.

To solve a CI problem, realistic boundaries must be established. Considerations in setting the boundaries may involve: many habitats; both aquatic and terrestrial wildlife; minor and major effects; impacts not related to a specific project; geographic distribution; delayed impacts; big projects, little projects, and combination projects; many different issues; and both primary and secondary impacts in the past and the future.

For a particular CI assessment, there are numerous situation limitations. Answers are wanted fast; but few, if any, CI assessment experts are available. Scientific assistance is frequently difficult to obtain because little effort is available for applied research and development in field applications. Because CI's are often the result of many separate actions, it is usually difficult to justify a CI asessment, except in the case where one management or regulatory agency has authority over all similar actions (e.g., Corps of Engineers dredge and fill permits for a bay). Many different elements may impact a single resource and the magnitude of the causes of the problem can be overwhelming. Finally, because impact predictions and mitigation recommendations are seldom evaluated, it is difficult to separate truths from beliefs.

To surmount the assessment tools constraints we must be able to define resource values, understand the various types of effects, and monitor CI's. We must know how to address a CI assessment (e.g., how much? how long? how far?) and what ecosystem elements and variables (e.g., thresholds of significance) to incorporate.

There are many constraints in the institutional mechanisms category that inhibit CI assessments. No Federal agency has the lead role, a clear mandate, or regulatory authority over CI's. Because of differing responsibilities and administrative policies between and even within agencies, severe institutional constraints may be present. Because CI assessments are new and beyond the scope of normal activities, there is a reluctance to get involved.

Control of development and management of natural resources is generally vested at the local (city or county) level. Local control of local issues (e.g., private land development) makes political sense; however, it makes less environmental sense when the political climates are vastly different between local governments or when complex interjurisdictional problems (e.g., international boundary issues) are involved.

Neither scientists nor the American public have yet agreed on an approach for evaluating or dealing with CI's. There are few goals, bottom lines, or foreseeable futures to use in dealing with the problems, so the views of actions to be taken are different. There are too many individual projects, each with its own deadlines, for them all to be meshed individually with the mitigation policy. The problem is confounded by lack of timely recognition of conflicts and reluctance to do follow-up evaluations and make improvements. We tend to begin by simplifying the problems rather than first concentrating on understanding the complexity of the problems that we face.

Ultimately, to remove the institutional mechanisms constraints, we must learn to use existing legislation more effectively and then identify needed legislation. One suggestion for immediate improvement is that operational (e.g., HR field office) and technical (e.g., Research and Development) personnel should meet more frequently in sessions such as this workshop. Another suggestion is that information on CI's and their assessment should be disseminated widely and in a timely manner.

PRIORITIZATION AND FOLLOW-UP DIRECTIONS

The participants identified over 100 potential action items that would remove the constraints preventing CI assessment. Regional representatives ranked the top third of the action items in terms of perceived importance (Appendix B). Each regional workgroup chose, from all of the action items, the 10 highest priority action items (Appendix C), from which a listing of the most frequently chosen action items (by category) was compiled (Appendix D).

Three action items were selected most frequently from the marketing category, which workshop participants agreed should come first in developing a CI program; five action items were identified from assessment tools; and four action items were chosen from the institutional mechanisms category, which comes after the marketing is done and the assessment tools are available (Table 2).

The 14 items brainstormed at the final workshop session were not presented in any order, so we placed them into the following four categories based on responsibility and timing:

1. Responsibility: ES Washington office, regional offices and field offices.

    - Prepare an issue/strategy paper for internal FWS review by program managers and higher-level officials.

    - Prepare and present a CI issue as an agenda item at the Ecological Services field office supervisors' conference.

    - Emphasize CI studies in research and development proposals generated from field offices and from Research and Development.

    - Incorporate CI assessment into Ecological Services' planning efforts.

Table 2. Tentative sequence of highest priority action items (selected by at least three FWS regions) for a proposed FWS cumulative impacts program.

Marketing Stage. Develop understanding and support for CI assessment by the following actions:

Create understanding and support for CI assessment by regional office and field level people;

Develop or obtain commitment from program managers and higher-level officials for CI assessment; and

Conduct follow-up studies on CI's and publish results of failure and success stories.

Assessment Tools Stage. Choose or develop the tools for CI assessment by the following actions:

Develop site-specific CI assessment prototypes;

Develop information management capability; and

Develop general methods for: (1) determining parameters to be evaluated; (2) establishing thresholds of significance for each parameter; (3) choosing techniques/models for assessing parameters; (4) identifying resources, their status, and trends; and (5) evaluating techniques for mitigating significant CI's.

Institutional Mechanisms Stage. Institutionalize CI assessment within FWS by the following actions:

Develop monitoring/follow-up guidance and include in Program Advice;

Develop a Federal coordinating body (interagency council);

Conduct CI assessments for National Species of Special Emphasis; and

Review and develop goals/policies for habitats and species.

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2. Responsibility: Chiefs of Divisions of Ecological Services and Biological Services.

    - Set up a CI coordinating group composed of members from the HR field offices, regional offices, and the Washington office and from Research and Development offices.

    - Establish responsibilities, timeframes, and objectives for a CI assessment project.

3. Responsibility: CI coordinating group (membership as assigned above).

    - Solicit the regions for suggestions for prototype CI assessments.

    - Guide an inventory of CI activities (literature search and who is doing what both inside and outside FWS).

    - Guide the assembly of a bibliography of CI's.

4. Responsibility: Western Energy and Land Use Team (WELUT).

    - Examine existing legislation and agency regulations and policies for the CI responsibilities of FWS.

    - Prepare an executive summary of this workshop with a description of the problem and refined, prioritized action items.

    - Prepare a workshop report (this document) and distribute it for comment by the workshop participants.

    - Prepare materials for the ES field office supervisors' conference.

    - Publish an information document that discusses CI case studies.

EPILOGUE

At their conference in late March 1985, the Ecological Services field office supervisors described how they address CI assessment currently and the changes that they want and need to improve their CI assessment ability. The field office supervisors believe that other agencies have a different perception than FWS of their requirement to conduct CI assessment; there is a lack of acceptance among other agencies of the need for CI assessment studies. This may be due to the difficulty in identifying CI's, quantifying impacts, distinguishing between direct and indirect effects, and identifying threshold values. Even state-of-the-art scientific information and analyses are not adequate for CI assessment studies, and improved assessment data bases will require long timeframes for acquisition and analysis.

The field office supervisors recommended the following actions for consideration as part of the current CI program:

- Environmental impacts that have already taken place should be documented.

- WELUT should conduct an informal survey to review and document CI studies that have been done and identify features that can be used in future studies.

- A capability to track CI's should be developed; it should incorporate an ecosystem approach, the establishment of goals to reach (not thresholds to avoid), and use existing inventory tools.

- WELUT should identify existing techniques and develop new methodologies for CI assessment and have them evaluated by the field offices.

- General public support for CI assessment should be developed.

- Prototype (trial demonstration) assessment studies should deal with areas that have high visibility.

- DBS should prepare an extension education booklet on CI's.

- The CEQ requirement for CI assessment should be clarified; the Washington office of Ecological Services should develop this clarification.

- A CI assessment information management capability should be developed.

- DBS should examine ways to disseminate CI information to the field offices and establish an assessment focal point and information center.

- A time and money commitment should be made to the development of CI assessment.

- Habitat Resources should provide direction to DBS for CI assessment process development.

- Similar direction should be provided to the field offices and regional offices that are involved in the prototype CI assessment studies.

- DBS and the field offices should cooperate and coordinate with other agencies in developing and using CI assessment procedures.

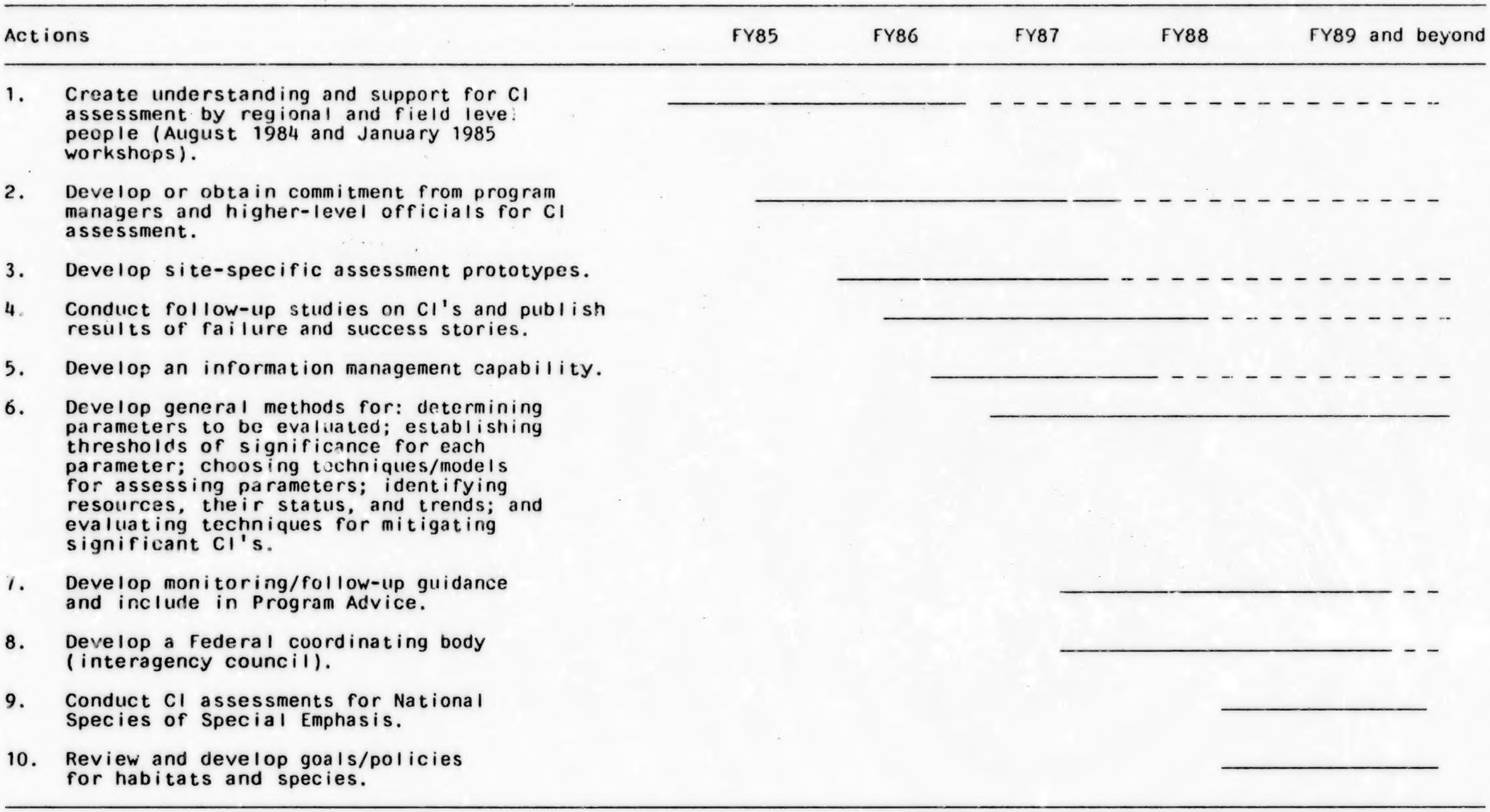
The field office supervisors recommended the following actions for consideration as a future part of the CI program:

- A comprehensive CI section should be included eventually in Fish and Wildlife Coordination Act reports.

- Currently, the CI section is usually missing or only identifies the need for a CI assessment. FWS credibility should be enhanced by developing assessment capabilities before taking premature actions.

- As CI assessment procedures are developed, they should be applied, tested, and evaluated by the field offices. Existing legislation dealing with CI's should be used better, and new legislation may be needed as public understanding of CI problems increases.

A tentative schedule of FWS actions was constructed after the field office supervisors' conference (Figure 1). The schedule does not prioritize one action over another, but represents a sequence of actions that may accomplish all of the highest priority actions identified at the workshop. Timing of the initiation and completion of each of the actions is necessarily speculative, but the relative timing of actions may be useful in future scheduling.



1. Create understanding and support for CI assessment by regional and field level people (August 1984 and January 1985 workshops).
2. Develop or obtain commitment from program managers and higher-level officials for CI assessment.
3. Develop site-specific assessment prototypes.
4. Conduct follow-up studies on CI's and publish results of failure and success stories.
5. Develop an information management capability.
6. Develop general methods for: determining parameters to be evaluated; establishing thresholds of significance for each parameter; choosing techniques/models for assessing parameters; identifying resources, their status, and trends; and evaluating techniques for mitigating significant CI's.
7. Develop monitoring/follow-up guidance and include in Program Advice.
8. Develop a Federal coordinating body (interagency council).
9. Conduct CI assessments for National Species of Special Emphasis.
10. Review and develop goals/policies for habitats and species.

Figure 1. Tentative schedule of a proposed FWS cumulative impacts program based on highest priority actions selected by at least three FWS regions.

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APPENDIX A. LIST OF PARTICIPANTS.

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APPENDIX B. ALL ACTIONS IDENTIFIED FOR POTENTIAL INCLUSION IN A CUMULATIVE IMPACTS ASSESSMENT PROGRAM FOR FWS.

CATEGORY: DEFINE TERMS

1. Define for the Service the terms used in CI assessment.

   For example: major/minor projects, delayed impacts, resource value, cumulative impacts/effects, impact zone, and evaluation species.

2. Provide an operational definition of CI's by developing a list of perceived CI problems and associated causes and consequences. The list may be either representative or comprehensive.

   Approach: a. Inventory CI problems
   b. Conduct a cause-effect analysis of CI problems:
   causes → problem → consequences
   c. Obtain Service-wide adoption of the operational definition of CI.

Note: Because only two actions were identified, the actions were not prioritized.

CATEGORY: MARKETING

Number of high regional rankings	
9	1. Develop or obtain a commitment from program managers and higher-level officials for CI assessment. - issue or strategy statement - budget and manpower requests - establish triggering events
7	2. Create understanding and support for CI assessment by regional and field level people. - field critique of workshop products - workshop for field supervisors - provide examples of CI studies and results - get field offices to do special CI studies - establish pool of CI assessment expertise to aid in problem analysis, tool identification, etc., when required
5	3. Conduct follow-up studies and publish results of failure stories with CI's.
4	4. Communicate CI assessment concepts to "publics" at appropriate levels and types. - be involved early in the planning and decision process - provide strategy based on market analysis (e.g., menu of alternatives)
1	5. Develop an ethic or awareness of CI processes. - public involvement of media - success with item above dictates the "ethics level" (feedback) - develop publications for the lay public
0	6. Design and implement market analyses for each "public."
0	7. Measure effectiveness of follow-up studies on the decision-making processes of the "publics."
0	8. Develop performance standards for FWS personnel for enhancing public awareness and involvement (Beat the bushes).

CATEGORY: ASSESSMENT TOOLS

Number of high regional rankings			
8	1.		Develop general methods to:
6		A.	Choose techniques/models for assessing parameters
4		B.	Establish management goals
4		C.	Determine parameters to be evaluated
4		D.	Establish "threshold of significance" for each parameter
3		E.	Identify resources, their status, and trends
3		F.	Evaluate techniques for mitigating significant CI's
3		G.	Monitor project impacts
2		H.	Guidance on problem identification (problem cause, consequence, and solution analysis)
1		I.	Identify potential sources of impacts
1		J.	Determine "project impact zone" for each parameter
1		K.	Verify models and process
4	2.		Develop site-specific prototypes using the following:
		A.	Simplicity
		B.	Importance to FWS
		C.	Existing data
		D.	Potential impacts
		E.	Diversity of habitats and projects
		F.	Feasibility
		G.	Politics
2	3.		Develop information management capability.
		A.	Develop field office computer-based capability/ management information system.
		B.	Develop and maintain mechanisms for information transfer to maintain state-of-the-art.
2	4.		Develop oversight (coordination) group.
2	5.		Develop acceptability of CI assessments in-house and externally by working with other agencies.
0	6.		Develop training programs.

CATEGORY: INSTITUTIONAL MECHANISMS (INSIDE FWS)

Number of high regional rankings	
	1. A. Coordinate with:
5	- Habitat Resources programs
5	- Intraagency
3	- External
1	- State/other
1	- Congressional
0	B. Encourage third party law suits.
	2. Planning/policy development/improve management
8	- Elevate CI as priority.
7	- Review and develop goals/policies, e.g., habitat and species policy.
6	- Develop monitoring/follow-up guidance and include in Program Advice.
4	- Adapt mitigation policy to address CI.
4	- Identify resources needed.
3	- Develop guidelines for implementing policies.
3	- Form assessment groups to evaluate/implement CI assessment.
2	- Propose regulatory legislation.
1	- Emphasize decentralized management.
1	- Revamp management structure.
1	- Develop mechanism for dealing with private development.
1	- Include CI in resource planning process.
	3. Education
3	- Educate the public.
2	- Train assessment teams.
2	- Develop and promote a conservation ethic.
2	- Collect and disseminate CI information.

Number of high regional rankings	
	4. Technical
7	- Develop/improve CI assessment tools (e.g., geographical information system, instream flow incremental methodology).
5	- Define levels of biological significance.
4	- Incorporate ecosystem approach, using habitat and species evaluation system.
3	- Conduct CI assessment for National Species of Special Emphasis.
3	- Improve predevelopment consultation.
2	- Identify high CI areas by region.
1	- Provide technical assistance to State and local entities and others.

CATEGORY: INSTITUTIONAL MECHANISMS (LEGAL ASPECTS)

Number of high regional rankings	
	1. Coordination items: Influence other State and Federal agencies and the public to take actions that enhance assessment of CI.
5	• Influence the public
5	• Increase public involvement
5	• Participate in interagency council
3	• Influence State/local legislatures
0	• Work with CEQ
	2. Implementation items: Address CI by using existing legislation to the fullest, seeking a solicitor's opinion on legislation affecting FWS that might enhance the Service's ability to get involved in CI assessment, promulgate appropriate regulations, e.g., Fish and Wildlife Coordination Act, petition other agencies to meet their CI assessment responsibilities (as FWS sees them), and initiate third party involvement to increase CI assessment.
7	• Use existing legislation
5	• Provide tax incentives to protect natural resources
4	• Petition other agencies
3	• Promulgate regulations
1	• Seek solicitor's opinion
0	• Encourage third party lawsuits
0	• Encourage third party petitions
	3. Planning items: Determine FWS' and lead agency's legal obligations to assess CI's, then identify and draft needed legislation that strengthens FWS' ability to assess CI's and deal with private development not presently covered by existing legislation.
5	• Identify needed legislation
4	• Determine lead agency's obligations
2	• Determine legal obligations
2	• Draft legislation
1	• Develop legislation for private development

CATEGORY: INSTITUTIONAL MECHANISMS (OUTSIDE FWS)

Number of high regional rankings	
7	1. Develop CI methodologies for other agencies to use.
6	2. Respond when technical assistance is requested.
5	3. Develop memorandum of understanding with other agencies.
5	4. Influence and educate the public.
4	5. Seek funds for follow-up activities.
4	6. Improve coordination in early project planning (pre-development consultation).
3	7. Develop FWS policies to better deal with other agencies.
3	8. Promulgate interagency regulations.
3	9. Determine capabilities to assess/monitor CI's.
3	10. Define impact areas.
3	11. Serve as focal point for CI's to alleviate agency inconsistency.
2	12. Hold coordination meetings.
2	13. Develop Federal coordinating body.
2	14. Determine policies of other agencies.
2	15. Petition other agencies.
2	16. Increase decentralized management for dealing with outside agencies.
2	17. Develop a better understanding of other agencies' views on CI.
1	18. Support other agencies' budget requests for CI assessment.
1	19. Encourage third party lawsuits.
1	20. Seek solicitor's opinion.
0	21. Work with CEQ.
0	22. Encourage third party petitions.

APPENDIX C. REGIONAL RANKING OF 10 HIGHEST PRIORITY ACTIONS FOR ADDRESSING CUMULATIVE IMPACTS.

FWS REGION 1

1. Item: Develop or obtain commitment from program managers and higher-level officials (Marketing).
2. Item: Develop general assessment threshold determinations (Assessment Tools).
3. Item: Develop techniques/models for assessing parameters (Assessment Tools).
4. Item: Develop assessments for project impact zone (Assessment Tools).
5. Item: Determine parameters for general assessments (Assessment Tools).
6. Item: Create understanding and support for CI assessment by regional office and field office personnel (Marketing).
7. Item: Determine FWS/lead agency obligations to assess CI (Institutional Mechanisms: Legal).
8. Item: Conduct follow-up studies and publish results of horror and success stories (Marketing).
9. Item: Develop site-specific assessment prototypes (Assessment Tools).
10. Item: Conduct CI assessments for National Species of Special Emphasis (Institutional Mechanisms - FWS).

FWS REGION 2

1. Item: Elevate CI as a priority (Institutional Mechanisms - FWS).
   Reasons: Need to make FWS aware of CI problems/issues early (sell within the Service).

2. Item: Develop a Federal coordinating body (Institutional Mechanisms - External).
   Reasons: Sell to other agencies.

3. Item: Use existing legislation (Institutional Mechanisms - Legal).
   Reasons: Need to review existing legislation, regulations, and guidelines for their usefulness in addressing CI assessment.

4. Item: Develop oversight (coordination) group (Assessment Tools).
   Reasons: This needs to be done before method is developed.

5. Item: Develop general methods for determining parameters to be evaluated (Assessment Tools).

6. Item: Develop general methods to choose techniques/models for assessing parameters (Assessment Tools).

7. Item: Develop general methods to monitor project impacts (Assessment Tools).

8. Item: Develop general methods to establish "threshold of significance" for each parameter (Assessment Tools).

9. Item: Develop site-specific prototypes (Assessment Tools).

10. Item: Develop information management capability (Assessment Tools).

FWS REGION 3

1. Item: Develop information management capabilities (field office computer-based capabilities) (Assessment Tools).
   Reasons: With complicated and large amounts of information, this is the only way to adequately deal with this problem.

2. Item: Training programs (Assessment Tools).
   Reasons: Biologists need training to deal with cumulative impacts.

3. Item: General methodology for establishing management goals (Assessment Tools).
   Reasons: To adequately make decisions, we need management goals.

4. Item: General method for identifying resources, status, and trends (Assessment Tools).
   Reasons: Need this to determine priorities: Which resources are being impacted the most?

5. Item: General method for guidance on problem identification (Assessment Tools).
   Reasons: Since cumulative impact assessment is complicated, need general methodologies to adequately assess CI.

6. Item: Improve predevelopment consultation (Institutional Mechanisms -FWS).
   Reasons: With better methods for identifying cumulative impacts, we can better influence agencies at early stages of planning.

7. Item: Tax incentives to protect natural resources (Institutional Mechanisms - Legal).
   Reasons: Offers best possibility for protecting resources on the ground.

8. Item: Influence State/local entities (Institutional Mechanisms - Legal).
   Reasons: With better methods for identifying cumulative impacts, we can better influence these entities.

9. Item: Promulgate interagency regulations (Institutional Mechanisms - External).
   Reasons: If we can work with other agencies to develop similar regulations, we would not have to fight as many battles.

10. Item: Develop mechanisms for dealing with private developments (Institutional Mechanisms - FWS).
    Reasons: Since most impacts (agriculture, forestry, urban development, etc.) are caused by private development, better mechanisms are needed to deal with these problems.

FWS REGION 4

1. Item: Develop general methods for identifying resources, their status, and trends (Assessment Tools).
   Reasons: Basic data, trend analyses, inventory resources for which FWS is responsible and their "health".

2. Item: Establish management goals (Institutional Mechanisms - FWS).
   Reasons: Force central office policy. Reverse existing procedure of having field office nominate policy and Washington office disown it.

3. Item: Develop oversight group (Assessment Tools).
   Reasons: Designate individuals' responsibility to continue this effort.

4. Item: Develop and obtain commitment from program managers for CI assessment (Marketing).
   Reasons: Demonstrate real concern over these issues.

5. Item: Conduct follow-up studies and publish results of failure stories on cumulative impacts (Marketing).
   Reasons: Need to publicize and thus develop public support for the analysis.

6. Item: Develop guidelines for implementing policies (Institutional Mechanisms - FWS).
   Reasons: Needed to carry out the management goals established in item #2 above.

7. Item: Develop monitoring/follow-up guidance and include in the Program Advice (Institutional Mechanisms - FWS).
   Reasons: Provides guidance and direction to regional and field offices to deal with cumulative impacts.

8. Item: Educate the public (Institutional Mechanisms - FWS).
   Reasons: Can't get anywhere without public support/demands.

9. Item: Promulgate interagency regulations (Institutional Mechanisms - Legal).
   Reasons: Give framework and mechanism to insure that FWS has a voice in decisions and that procedures are followed.

10. Item: Conduct CI assessment for National Species of Special Emphasis (Institutional Mechanisms - FWS).
    Reasons: Force research efforts on species of concern and provide data for use in mitigation policy.

FWS REGION 5

1. Item: Develop or obtain a commitment from program manager and higher-level officials for CI assessment (Marketing).
   Reasons: Without this commitment we will never be able to deal with cumulative impact issues.

2. Item: Develop and promote a conservation ethic (Institutional Mechanisms - FWS).
   Reasons: People need to realize the consequences of their actions and ways to reverse current trends.

3. Item: Public support and education (?).
   Reasons: Public support is a basis for how much can be done in an area.

4. Item: Revamp management structure (Institutional Mechanisms - FWS).
   Reasons: The current system is unworkable, duplicative, and redundant and serves to promote stagnation and impotence.

5. Item: Emphasize decentralized management (Institutional Mechanisms - FWS).
   Reasons: Timely decisionmaking should come more easily from lower levels.

6. Item: Propose regulatory legislation (Institutional Mechanisms - FWS).
   Reasons: We need organic legislation to protect wetlands, deal with upland issues, etc.

7. Item: Review and develop goals and policies (Institutional Mechanisms - FWS).
   Reasons: We need good goals and policies to make this program work.

8. Item: Evaluate techniques for mitigating significant cumulative impacts (Assessment Tools).
   Reasons: We need better evaluation techniques.

9. Item: Choose and develop techniques for mitigating significant CI (Assessment Tools).
   Reasons: It is frequently difficult to know how to mitigate for individual impacts, let alone for small, seemingly insignificant (to the public) impacts.

10. Item: Develop CI methodologies for other agencies to use (Institutional Mechanisms - External).
    Reasons: A strong development role will give us a presence in this program area.

FWS REGION 6

1. Item: Review and develop goals and policies.
   Develop guidelines for implementing.
   Adopt mitigation policy to address CI (Institutional Mechanisms - FWS).
   Note: These are all the same.

2. Item: Include CI in resource planning.
   Identify high CI areas.
   Conduct CI assessment for National Species of Special Emphasis (Institutional Mechanisms - FWS).
   Note: These are all the same.

3. Item: Develop monitoring and follow-up guidance in Program Advice (Institutional Mechanism - FWS).

4. Item: Determine legal obligations (Institutional Mechanisms - Legal)

5. Item: Identify resources, status, trends (Assessment Tools).

6. Item: Choose techniques and models for CI's (Assessment Tools).

7. Item: Monitor project impacts (Assessment Tools).

8. Item: Develop information management capability (Assessment Tools).

9. Item: Communicate CI assessment concepts to "publics" (Marketing).

10. Item: Establish an interagency council (Institutional Mechanisms - Legal).

FWS REGION 7

1. Item: Define for the Service the terms used in CI assessment (Define Terms).

   Reasons: It is necessary to pull the work already done together and promote internal understanding of the problem.

2. Item: Develop or obtain a commitment from PM's and higher-level officials for CI assessment (Marketing).

   Reasons: It is impossible to proceed in a meaningful manner without management commitment.

3. Item: Create understanding and support for CI assessment by regional and field level people (Marketing).

   Reasons: Regional and field level acceptance are necessary for implementation.

4. Item: Develop general methods for guidance on problem identification (Assessment Tools).

   Reasons: Problem clarification is important to identify underlying causes of the overall problem and identify those causes that can be meaningfully addressed.

5. Item: Develop general methods for establishing "threshold of significance" for each parameter (Assessment Tools).

   Reasons: We need to understand limitations within the natural system and set goals to preserve the natural system.

6. Item: Develop general methods for evaluating techniques for mitigating significant CI's (Assessment Tools).

   Reasons: We must be able to successfully mitigate CI or measurement and discussion of CI's becomes an academic exercise.

7. Item: Develop monitoring and follow-up guidance (Institutional Mechanisms - FWS).

   Reasons: Assessment technology is constantly improving and it is necessary to upgrade and fine tune our tools.

8. Item: Review and develop goals and policies (Institutional Mechanisms - FWS).

   Reasons: Existing goals and policies do not adequately address cumulative impacts and they need to be incorporated.

9. Item: Incorporate ecosystem approach using habitat and species evaluation system (Institutional Mechanisms - FWS).

   Reasons: Need to focus on system interactions and interdependencies to be able to track cumulative impacts.

10. Item: Increase public involvement. Influence the public to take actions that enhance assessment of CI (Institutional Mechanisms - Legal).

    Reasons: Without public support and involvement, the program is likely to fail.

FWS REGION 8

1. Item: Interagency coordination (Institutional Mechanisms - FWS).
2. Item: Review and develop goals and objectives (Institutional Mechanisms - FWS).
3. Item: Develop and improve CI assessment tools (Institutional Mechanisms - FWS).
4. Item: Incorporate ecosystem approach, using habitat and species evaluation system (Institutional Mechanisms - FWS).
5. Item: Conduct workshop for field supervisors (Marketing).
6. Item: Establish pool of CI assessment expertise to aid in problem analysis, tool identification, etc. when required (Marketing).
7. Item: Establish "thresholds of significance" for each parameter (Assessment Tools).
8. Item: Choose or develop techniques/models (Assessment Tools).
9. Item: Develop site-specific prototypes (Assessment Tools).
10. Item: Develop information management capabilities (Assessment Tools).

FWS REGION 9

1. Item: Develop general methods to determine parameters to be evaluated (Assessment Tools).

2. Item: Develop general methods for establishing "thresholds of significance" for each parameter (Assessment Tools).

3. Item: Develop general methods for choosing techniques/models for assessing parameters (Assessment Tools).

4. Item: Develop general methods for determining "project impact zone" for each parameter (Assessment Tools).

5. Item: Develop general methods for evaluating techniques for mitigating significant cumulative impacts (Assessment Tools).

6. Item: Develop site-specific prototypes (Assessment Tools).

7. Item: Create understanding and support for cumulative impact assessment by regional and field level people (Marketing).

8. Item: Conduct follow-up studies and publish results of failure stories concerning cumulative impacts (Marketing).

9. Item: Develop information management capability (Assessment Tools).

10. Item: Define terms (Define terms).

APPENDIX D. ACTIONS (BY CATEGORY) CHOSEN AS ELEMENTS OF TOP 10 HIGHEST PRIORITY ACTIONS BY THE NINE REGIONAL WORKGROUPS.

Number of high regional rankings	Action	Level of responsibility[a]
	Category: Define Terms	
	Define terms.	R&D, WO
	Category: Marketing	
4	Develop or obtain commitment from program managers and higher-level officials for CI assessment.	FO, RO, WO
3	Create understanding and support for CI assessment by regional and field level people.	WO, R&D
3	Conduct follow-up studies and publish results of failure and success stories on cumulative impacts.	FO, R&D
1	Conduct workshop for field supervisors.	WO, R&D
1	Establish pool of CI assessment expertise to aid in problem analysis, tool identification, etc., when required.	R&D, WO
1	Communicate CI assessment concepts to "publics" at appropriate levels and types.	FO, RO, WO, R&D

Number of high regional rankings	Action	Level of responsibility[a]
	Category: Assessment Tools	
5	Develop general methods to establish "thresholds of significance" for each parameter.	R&D, FO
5	Develop information management capability.	R&D, FO
3	Develop general method for identifying resources, their status, and trends.	R&D, FO
3	Develop general methods for determining parameters to be evaluated.	R&D, FO
3	Develop general methods to choose techniques/models for assessing parameters.	R&D, FO
3	Develop general methods for evaluating techniques for mitigating significant CI's.	R&D, FO
3	Develop site-specific assessment prototypes.	FO, R&D
2	Develop oversight (coordination) group.	WO, R&D
2	Develop general methods for determining "project impact zone" for each parameter.	R&D, FO
2	Develop general methods for guidance on problem identification.	R&D, FO
2	Develop general methods to monitor project impacts.	R&D, FO
2	Choose or develop techniques/models for CI assessment.	R&D, FO
1	Develop and provide training programs.	R&D, RO

Number of high regional rankings	Action	Level of responsibility[a]
1	Develop general methodology for establishing management goals.	R&D, RO
1	Choose and develop techniques for mitigating significant CI.	R&D, FO
	Category: Institutional Mechanisms	
5	Review and develop goals/policies for habitat and species.	RO, WO
3	Develop Federal coordinating body.	WO
3	Develop monitoring/follow-up guidance and include in Program Advice.	WO
3	Conduct CI assessment for National Species of Special Emphasis.	RO, WO
2	Develop guidelines for implementing policies.	WO
2	Determine FWS and lead agency legal obligations to assess CI's.	WO
2	Educate the public.	FO, RO, WO, R&D
2	Incorporate ecosystem approach using habitat and species evaluation system.	FO, R&D
2	Promulgate interagency regulations.	WO
1	Elevate CI's as a priority.	FO, RO, WO, R&D
1	Adapt mitigation policy to address CI's.	WO
1	Develop and promote a conservation ethic.	FO, RO, WO, R&D

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[a] FO = HR field office; RO = HR regional office; R&D = Research and Development; WO = HR Washington office.

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This report presents the results of a second U.S. Fish and Wildlife Service workshop on cumulative impacts (CI). Workshop participants identified a multitude of problems that are having a cumulatively significant impact on the fish and wildlife resources of the Nation and categorized these into five types: water development, land-use change, erosion and eutrophication, chemical disposal, and overharvest. Seventy-eight constraints that are currently preventing CI assessment were identified and assigned to four categories: define terms, marketing, assessment tools, and institutional mechanisms. Potential solutions that would remove the constraints were identified and prioritized for each of the categories. Fourteen action items for advancing the CI program were assigned to specific Service entities for implementation.

17. Document Analysis a. Descriptors

Natural resources
Meetings

b. Identifiers/Open-Ended Terms

Cumulative impacts
Mitigation
Impact assessment
Workshop

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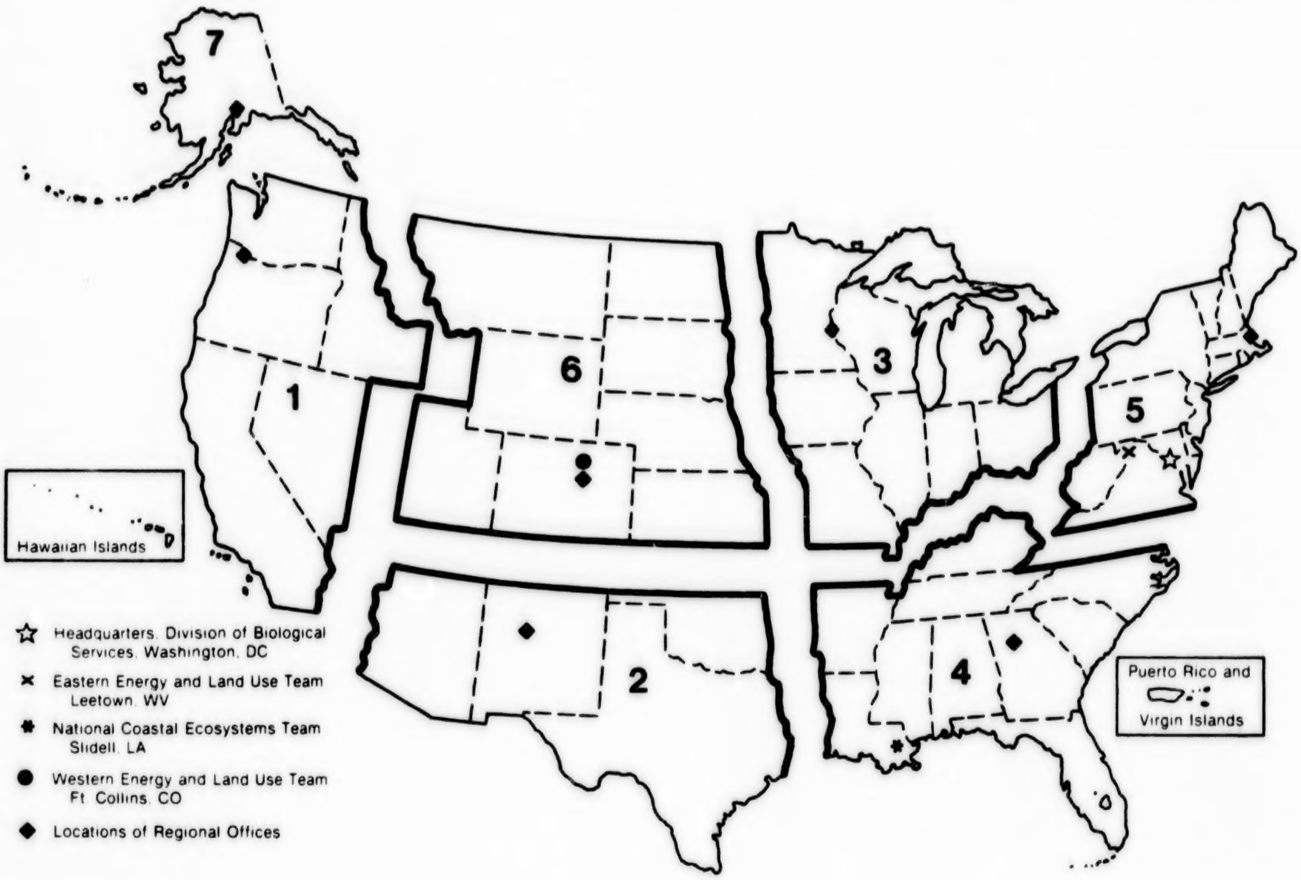
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DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

END

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